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Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

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WORLDWIDE REPORT
NUCLEAR DEVELOPMENT AND PROLIFERATION

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JAPAN

KURANARI URGED TO ATTEND DISARMAMENT CONFERENCE

OW130613 Tokyo KYODO in English 0350 GMT 13 Oct 86

[Text] Tokyo, 13 Oct (KYODO)--Miljan Komatina, secretary general of the 40-member Geneva-based Conference on disarmament, told Foreign Minister Tadashi Kuranari on Monday that Japan should make a greater contribution to world disarmament efforts, a Foreign Ministry official said. Komatina, here since last Saturday at the invitation of the Foreign Ministry, asked Kuranari to attend the Geneva conference and express Japan's position on disarmament, referring to the many visits and speeches to the conference by foreign ministers and prime ministers of other countries, the official said.

Kuranari said Japan has proposed monitoring of nuclear tests using Japanese expertise on earthquake detection. He expressed hopes of attending the disarmament conference after consulting with Prime Minister Yasuhiro Nakasone, the official said.

According to Komatina, the conference is making progress on inspection of chemical weapons. He said the Soviet Union is trying to narrow the inspection range, while the United States wants a wide inspection, adding that a compromise might be the best solution, according to the official. Komatina will meet Diet members and visit Nagasaki and Hiroshima before he leaves Tokyo on 22 October.

/9274

CSO: 5160/010

INTER-AMERICAN AFFAIRS

ARGENTINE MINISTER NOTES 11 PROJECTS WITH BRAZIL

Rio de Janeiro O GLOBO in Portuguese 6 Sep 86 p 16

[Text] Buenos Aires--Five weeks after Presidents Jose Sarney and Raul Alfonsin signed the 72 protocols that formalize the economic integration between Brazil and Argentina, the two countries reached a perfect understanding, in practice, on one of the most important items in the agreement; the nuclear area.

The director general of Nuclear and Disarmament Affairs of the Foreign Ministry, Minister Adolfo Saracho, told O GLOBO yesterday afternoon that the positions of the two governments proved to dovetail and coincide so closely that there are already 11 concrete projects of collaboration between Brazil and Argentina in that area.

Saracho said: "The study groups will present a detailed report on those projects next week, specifying their feasibility and the amount of funds necessary to begin to develop them."

According to him, all of the planning part and its respective estimates will be ready in November, when the governments will decide if all of the programs will be begun simultaneously or if priority projects will be defined. Everything is going to depend on the costs, which initially would be divided equally between the two countries.

Alleging "reasons of state," Minister Saracho said that he could not yet reveal the nature of all 11 projects.

"There are some that we cannot reveal now, for one reason or another, but by the end of the year everyone will know what it is all about. What I can say is that there is no secret project, as is rumored. What I mean to make clear by that is that there is no military project being developed jointly."

According to the director general of Nuclear Affairs and Disarmament of the Argentine Foreign Ministry, the two countries will work together, especially to achieve mastery of the technology for the manufacture and use of low-enrichment fuels, which would be used in research reactors.

Another program pertains to providing Brazil and Argentina with the capability to produce radiation detectors.

With regard to nuclear safety, the projects provide for the development of calculation codes for the release of radioactive materials from the nucleus to the primary circuit and from there to the reactor containment in accident conditions.

"We are also working on the development of a philosophy and the implementation of common plans," concluded Saracho.

8711/7051
CSO: 5100/2005

ARGENTINA

PRESIDENT INAUGURATES TANDAR ACCELERATOR

PY241854 Buenos Aires TELAM in Spanish 2046 GMT 23 Oct 86

[Text] Buenos Aires, 23 Oct (TELAM) -- The Tandar [Argentine Tandem] Laboratory, which will be inaugurated today by President Raul Alfonsin, is part of the National Commission for Atomic Energy (CNEA) physics department. The laboratory features a heavy ions accelerator of 20 billion volts, one of the four most advanced in the world after those of Oak Ridge (U.S.A.), Ajeri (Japan) and Daresbury (United Kingdom).

The main objective of the Tandar laboratory, which is located at the Constituyentes Atomic Center on General Paz Avenue in San Martin District, is to conduct basic research in nuclear physics, solid-state physics, and atomic physics.

The Tandar is a tool used to study the atomic nucleus, by accelerating ions. An intense electric field accelerates the ions and permits studies on the properties of nuclei, their reaction mechanisms, and their inter action in condensed matter.

This is a laboratory of great versatility in which virtually all the stable elements known to man can be accelerated. Highly radioactive elements can be obtained through nuclear reactions between two heavy nuclei. In addition, nuclear fission and fusion in an extensive range of different systems can be investigated.

The Tandar laboratory will also host groups carrying out basic and applied research in other fields. They will also study the detection of damage to biological and metallurgic objects through the simulated radiation of ions, the production of new radioisotopes and of others that presently must be imported; the analysis of samples without damaging them, and the dating of archeological samples, among other activities.

The Tandar construction project was approved in August 1976. The accelerator was ordered from Electrostatics International Inc., one of the two U.S. companies that sell this equipment.

The detail engineering and local construction work was entrusted to Technit, the vessel construction and installation to Chicago Bridge Argentina, the civil works to Vialco, and the electromechanic works to the Vialco-Somerfin consortium.

The accelerator was commissioned in September 1985. During previous tests it generated a maximum of 24.7 million volts, the largest amount of energy ever generated artificially in the Southern Hemisphere.

The main tower is 13.70 meters high and has a 2 meters of protective shielding supporting the base of the pressure vessel. The tower contains the accelerator column

and the terminal which is surrounded by a sulphur hexafluoride (hexafloruro de azufre) gas, used to create an atmospheric system as (electrically) inert as possible.

The control rooms, or main measuring rooms, are located in the lower section, as are the test rooms, a revolving 7 degree reflector magnet, and the gas storage tanks.

More than 60 physicists work in the CNEA physics department with 45 of them holding masters degrees either in Argentine or foreign universities. A group of 40 engineers, together with 40 experts, are in charge of operation and maintenance, supplementary equipment and support laboratories.

/9274

CSO: 5100/2029

ARGENTINA

CONGRESSIONAL COMMITTEE WITH BROAD NUCLEAR POWERS PROPOSED

Buenos Aires LA PRENSA in Spanish 23 Sep 86 p 6

[Text] National Deputy Maria Julia Alsogaray, of the Democratic Center Union, introduced a bill intended to "set up a bicameral commission with ample powers to investigate, verify, request documentation, visit public and private installations where radioactive elements and materials are stored, manufactured, transformed or handled in any manner.

"For that purpose, it will enjoy the broadest powers and all national, provincial and municipal authorities are bound to make available the fullest information about any aspect concerning nuclear security that the commission requires,

"It will be entitled to seek the advice of national or foreign scientific technicians, and ask for information that it deems appropriate from international organizations of nuclear security.

"It should give special emphasis to the hypotheses of nuclear accidents, and, in cooperation with the civil defense organizations, it should recommend measures that it deems appropriate to prevent and correct any defect that will pose an eventual threat, studying the location of nuclear installations and all other aspects that will help to enhance public security.

"It should consider and propound the necessary measures to dispose of nuclear waste with the greatest safety.

"It should study projects for the location of new nuclear plants and other installations for the purpose of avoiding as much as possible their proximity to inhabited areas.

"It may propound the institution of a national organization of nuclear security.

"It should specifically analyze the nuclear situation in neighboring countries, and the possible consequences of a nuclear accident in another country."

8414/12859
CSO: 5100/2009

ARGENTINA

UNIVERSITY OFFICIALS ANNOUNCE NUCLEAR ENGINEERING ACCORD

Cordoba LA VOZ DEL INTERIOR in Spanish 20 Sep 86 p 7

[Text] In a ceremony that was held yesterday at the Regional School of Cordoba of the National Technological University (UTN), an agreement was signed between that institution of higher education and the National Commission for Atomic Energy (CNEA).

The UTN, represented by its rector, Juan Carlos Recalcatti, and the CNEA, represented by the manager of the Embalse Nuclear Power Plant, Ricardo Diaz, acting on behalf of the chairman of the state enterprise, agreed on a program of mutual cooperation and technical assistance for the training of human resources and the dissemination of technology.

For the practical purposes of this agreement, both institutions concurred on the establishment of a coordinating committee that will serve to centralize, guide and promote the programs, initiatives and projects concerning the stated goals.

The rector of the UTN explained the extent of these accords set forth in the addenda dealing with three concrete projects: one is the possibility of exchanging professionals, courses and training between the heavy water power plant in Arroyito, Neuquen, and our academic unit of Cutral-Co Plaza Hincul-Confluencia; the second concerns the Delta Regional School in Campana, and the postgraduate courses in nuclear engineering that the Atucha atomic power plant would like it to offer; and as to the third, it could be almost the same thing here in Cordoba.

With regard to this project, Recalcatti stated that "taking into account the tasks that are being performed at the Embalse power plant and the development tasks that the regional school can provide, specialized courses in nuclear engineering could be set up in Cordoba or in Rio Tercero."

With respect to the financing of these projects, the UTN rector explained that "for each accord, everything dealing with equipment will be discussed separately and furnished by both entities, that is to say, by the cooperative system."

Asked whether this agreement will be used for the production of isotopes, Regino Maders, dean of the UTN's Regional School of Cordoba, considered that it "could be so in a second stage" inasmuch as, in principle, "this first

portion would consist of an exchange of scientific action directed at courses and training, yet that is foreseen.

"Though the intention exists," Maders added, "we cannot assure yet what would be included in the area of isotopes because there are some agreements with the provincial government that we would have to coordinate, therefore that would be a second stage."

On a different subject, the UTN rector was asked about the present situation at the university with respect to the quadripartite government, and he said that once "the incorporation of the nonteaching personnel to the university administration as the fourth estate was decided," the elections are being set up "after we agreed with the union that those elections would be held on 16 November."

8414/12859

CSO: 5100/2009

ARGENTINA

RADIOACTIVE MATERIAL STOLEN FROM PHYSICIAN

PY161344 Buenos Aires TELAM in Spanish 0031 GMT 16 Oct 86

[Text] Buenos Aires, 15 October (TELAM)--The National Commission for Atomic Energy (CNEA) tonight made it clear that the theft of equipment used to produce Technetium-99 from an unofficial vehicle is not cause for concern because the equipment has a low radioactivity level.

The CNEA thus responded to initial reports that Dr Ana Baigorria, an expert in nuclear medicine, had reported the theft today in Monte Grande. According to police leaks, Baigorria reported the theft of a dangerous radioactive material, which could provoke high-risk environmental pollution, from the trunk of her Volkswagen car, which was parked at the intersection of Rodriguez and Yrigoyen Streets, within the jurisdiction of the 1st police precinct in Esteban Echeverria.

After being informed of the theft of the equipment used to produce Technetium-99, the CNEA reported in a communique that the equipment is currently used in nuclear medicine to conduct diagnostic procedures in which the radioactive material is administered to the patients.

The CNEA explained that the radioactive material contains approximately 100 millicuries and weighs less than 10 milligrams. An adequate shield ensures the safe use and transportation of the equipment with no risk whatsoever. On the outside of the container there are labels identifying the radioactive nature of the equipment.

In view of the low radioactivity of this substance and the safety shield surrounding it, this incident is not a cause for concern. Notwithstanding the CNEA has undertaken appropriate actions to determine responsibility in this case, the CNEA stated.

In conclusion, the CNEA has asked anyone having information on this matter to telephone the fire department of the Federal Police, radiologic protection section. The number is 21-2222.

/12913
CSO: 5100/2025

ARGENTINA

BRIEFS

CNEA SALE TO PRIVATE COMPANY--Buenos Aires, 14 Oct (DYN)--The National Commission for Atomic Energy (CNEA) today sold 500,000 curies of Cobalt 60 to the SMET [expansion unknown] company. The material will be used in the first private radiation plant to be built for medical purposes and for preserving food-stuffs in the country. [Excerpt] [Buenos Aires DYN in Spanish 0009 GMT 15 Oct 86 PY] /9274

CSO: 5100/2029

BRAZIL

MINISTER COMMENTS ON AERONAUTIC, NUCLEAR R&D

PY221111 Sao Paulo FOLHA DE SAO PAULO in Portuguese 19 Oct 86 p 8

[By Dalton Moreira, from the Valle do Paraiba branch office]

[Text] Aeronautics Minister Octavio Moreira Lima, 60, stated on 16 October that "government policy today calls for the development of nuclear technology, but exclusively for peaceful purposes," in accordance with the "basic guidelines set by President Jose Sarney." The minister added, "research is being conducted at the laboratory level. This will help Brazil to master advanced technology, but not for military purposes."

In an exclusive interview granted to FOLHA DE SAO PAULO, from his office in Brasilia, Moreira Lima said "any nation that wants to be considered developed must fully master three specific areas: informatics, space, and nuclear."

Research into uranium enrichment is being conducted at the Aerospace Technology Center [CTA] -- an organization headquartered in Sao Jose dos Campos (Sao Paulo) and linked to the Aeronautics Ministry -- through the Advanced Studies Institute [Instituto de Estudos Avancados -- IEAV]. The minister stated "nuclear research requires a large number of physicists, specialized engineers, and large investments. And we do not have them yet. This research also demands a technology which we have yet to develop, because nations which possess that technology will never transfer it."

Regarding the use of the military base installations in Serra do Cachimbo, Moreira Lima said "Brazil has very few testing grounds for its equipment," and that "Serra do Cachimbo is an uninhabited and barren region, since it lacks mineral resources which could be exploited. The land is not suitable for agriculture or for raising livestock. It is an ideal ground for testing weapons. Enterprises such as Avibras [Brazilian Airspace Industry] and Engesa [Specialized Engineers, Inc.] have expressed interest in using it." Although the land belongs to the Armed Forces Staff [EMFA] the area has been under the responsibility of the Aeronautics Ministry since the 1970's.

The subsonic fighter-bomb AMX, manufactured jointly by Brazil and Italy, will be tested this year at the Serra do Cachimbo base, according to the minister. This aircraft will go into service with the Brazilian Air Force in 1989. "We are in the final stage of preparing for tests with rockets and attack aircraft in the area reserved for that purpose," he stated. According to him, the military personnel living in that base are about to complete construction of a 300-kw hydroelectric plant that will supply energy to the base installations. For the time being, we are only doing that there." [quotation marks as published]

After 5 years in Serra do Cachimbo building wells for testing nuclear devices, and domes (for dumping nuclear waste), the CTA people left the area in July 1985. Now, the base is under the control of the Aeronautics Ministry Research and Development Department. According to Moreira Lima, "the CTA did nothing more in Serra do Cachimbo than to prepare the area for research and tests. This was preliminary work carried out by CTA technicians, preparatory work," he added.

Over the past few years considerable sales of Brazilian war materiel, to Saudi Arabia, Iraq, and Turkey, a market considered to be exclusively the domain of the great powers, represents for the minister a way to generate employment opportunities, in addition to making a "contribution to even up our trade balance," regardless of the criticisms of peaceful organizations. He added "the development of our country in terms of mastering advanced technology," is something which is "generally transferred to civilian use. Obviously there are those who criticize this, but we have to be realistic: the whole world needs weapons to maintain their Armed Forces on a professional level." For him, the great powers have achieved such a high level of technology and their products are so advanced that very few countries can purchase them. "In this manner, the so-called traditional equipment was no longer being produced by them" and the Brazilian businessmen "know how to exploit that empty space." He added: "Our products, in addition to being of excellent quality, are cheap."

By the end of 1989 Brazil will have placed in orbit its first data collecting satellite, which is being developed by the National Institute for Space Research (INPE)- The Air Force is participating in this project -- which is called Complete Brazilian Space Mission [Missao Espacial Completa Brasileira] (MECB), under the responsibility of the EMFA -- with the construction of a launching center and with the manufacture of the Satellite Launching Vehicle (VLS).

Regarding the base, which will be installed in Alcantara, Maranhao State, Moreira Lima has said "its construction is contemplated within the scheduled plan. We are now appropriating the land from the families that are residing within the future center's perimeter. We have already asked for bids and the construction of the base will begin in 1987." The same firmness cannot be observed about the deadlines for the construction of the VLS. Since the end of September the Institute for Space Activities (IAE) has been running into difficulties: Various types of experts have left the institute for better salaries. In view of this factor, the MECB runs the risk of being delayed.

Although Moreira Lima does not believe the project will be delayed, he does admit the IAE's brain drain is due to low salaries. The same thing happened at the INPE during 1985. "Regarding the development of the VLS, the only difficulty we are facing is the run on technicians and engineers, who have been lured away by private enterprises that pay better salaries." The minister also said the government has been warned of the need to update salaries, although he believes they will never equal those paid by the private sector. "But, if at least we can come close to them we will be in a position to maintain our team. That is our concern, because they are very experienced men." Regarding the MECB, he said that "it is a problem that is causing us grave concern."

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CSO: 5100/2026

BRAZIL

NUCLEBRAS OFFICIAL CITES NO CURRENT INTEREST IN REPROCESSING

Sao Paulo FOLHA DE SAO PAULO in Portuguese 7 Sep 86 p 11

[Text] Rio--NUCLEBRAS director of nuclear fuel, David Simon, said the day before yesterday that "the existence in Brazil of a parallel nuclear program that is beginning to be publicly admitted can generate doubts and restrictions on the part of the German partners of NUCLEBRAS' official nuclear program. In an exclusive interview with FOLHA, Simon complained about the "foot-dragging" pace at which the government is releasing the appropriations for construction of the Angra II and III plants and said that NUCLEBRAS' position on the matter, already expressed to the government, is that "either the program be carried out at a managerially responsible pace or not at all."

He revealed also that the government will "shortly" decide whether to accept the suggestion of the Commission for Evaluation of the Nuclear Program, that NUCLEBRAS--which is subject to the safeguards of the International Atomic Energy Agency (IAEA) that prohibit the use of nuclear technology for military purposes--and the Institute of Energy and Nuclear Research (IPEN) "join efforts" to convert yellow-cake (unenriched uranium) into uranium hexafluoride (uranium gas which will be enriched and resolidified).

According to Simon, IPEN has already succeeded in achieving that conversion "although not yet on an industrial scale." He declared that the decision on the matter will be "eminently a sensitive political decision because it implies leading NUCLEBRAS to depart from international safeguards and, in this particular case, to use a genuinely national technology developed under the parallel program."

The director of the state enterprise was one of the persons who drafted the Brazilian nuclear program based on the agreement with Germany. In 1976, after working for 3 weeks in setting up Nuclebras Engineering Corporation (NUCLEN), he broke with the Brazilian nuclear program because he considered that the company was creating "a climate of antagonism toward Eletrobras," a state enterprise where he had also worked, and because he believed that the initial aim of the program to build eight nuclear plants by 1990 "was not grounded on the economic reality and energy needs of Brazil." Invited to return to NUCLEBRAS in May, Simon accepted "because the program had been scaled down and I consider the schedule to complete Angra II by 1992 and Angra III by 1995 to be quite reasonable."

In his opinion, the government option to build Angra III "will keep NUCLEBRAS from being abolished--which would have occurred if the plants were not built --enabling the electric market between 1993 and 1994 to demand a new plant for the year 2000, as is my belief."

Within the program developed by NUCLEBRAS, there is one phase of the nuclear fuel cycle in which the company has no interest at the moment: reprocessing uranium. "To do this in order to reuse the uranium and the plutonium as new fuel for the plant has already been confirmed universally to be uneconomical. The United States, for example, has already decided not to reprocess uranium any longer. It has stored the material until a less expensive method than the so-called Purex process--the only one known--is discovered 30 or 40 years from now. I even believe that when that technology is discovered it will not be economically feasible for such small programs as the Brazilian one."

He was asked, since reprocessing is not economically feasible and it was being researched in the parallel program, whether this meant that plutonium is being sought for military devices. Simon said that he would prefer not to answer: "I only know about the official nuclear program: the NUCLEBRAS program."

Simon said also that NUCLEBRAS is not performing the reconversion of enriched uranium gas into powder and then into pellets; that they are being bought from the European consortium Urenco (Germany, Britain, and the Netherlands), which enriches the uranium by the ultracentrifugation method. Ultracentrifugation is the goal of the parallel program research. According to him, it is the recommendation of the Commission for Evaluation of the Nuclear Program that NUCLEBRAS commission that conversion by 1990, "but financial resources are needed for that, something we do not have at the moment."

According to the director of the state enterprise, the company is "at zero, without any money; only with lines of credit open abroad." He said that the appropriation "considered for next year is simply ridiculous: 200 million cruzados, which is just enough to cover 3 months of our payroll."

It was in that circumstance, according to David Simon, that NUCLEBRAS told the government: "Either the release of funds accompany the political decision already taken to build Angra II and Angra III, or it would be better to stop everything." He said that, as a matter of fact, in the present situation NUCLEBRAS is being led into "dangerous idleness in which the guarantees on already purchased equipment are expiring and it has not even been installed." It was idleness that led Nuclebras Heavy Equipment Corporation (NUCLEP) to seek new sources of income, such as shaping plates for a Navy submarine.

Despite the lack of funds, NUCLEBRAS is installing a 24-stage cascade in Resende (161 km from Rio) for the enrichment of uranium through the centrifugal jet process, to go into operation next year. An experiment with one stage was conducted in Germany and, according to Simon, it worked. If this first cascade works, the cost of enriching uranium by this method will be analyzed and the government will decide if it will install a 480-stage cascade at a cost of \$1 billion (13.8 billion cruzados) to enrich uranium at the percentage level necessary for the operation of the plants.

BRAZIL

PROBLEMS, ACHIEVEMENTS IN PROGRAMS WITH ARGENTINA, PRC

Nuclear Weapons Prospects

Sao Paulo TECNOLOGIA & DEFESA in Portuguese No 31, 1986 pp 20-25

[Article by Roberto Lopes]

[Text] The armed forces of Argentina and Brazil, following the same path, must enter into the nuclear era. Although both these countries are pursuing their research in the atomic energy sector for civilian purposes on a priority basis, both are also planning, as a first step toward the definitive sophistication of their military establishments, to build nuclear submarines.

The Brazilian authorities are unanimous in admitting that although Brazilian technicians can be regarded as the equal of the Argentines in terms of scientific training, the Argentine nuclear program has in the past 20 years had greater continuity than that in Brazil. Despite the political turbulence, Argentina has succeeded in maintaining a level of priority for its research in the atomic field which has guaranteed an adequate level of resources for the sector.

The Argentines opted for Canadian technology and oriented their research toward so-called "natural uranium," developing industrial plants using heavy water. This system is regarded by the Brazilian military as less stable, or in other words, as a system involving greater risks than the Brazilian choice based on German technology.

A part of Brazil's lag in the nuclear sector as compared to Argentina can also be attributed to the major change which occurred in the development of this research when an agreement with Germany replaced Brazil's previous cooperation with the Americans. At that point, the Angra I plant using Westinghouse technology was already an irreversible project, but this did not prevent Brazil from adopting the German experience.

The Brazilian government decided on the change when it was realized that the American technology had lost out on the world market to its European competitors, and that plants like that of Westinghouse were much smaller, and also offered less in terms of the availability of replacement parts, than those in Europe.

The plant using German technology had a serious disadvantage from the economic point of view, since it requires an expenditure of electrical energy which could be termed abusive, but the guarantee the Germans offered on the transfer of technology, along with the political atmosphere of greater confidence, led Brazil to sign a nuclear agreement with Germany.

Argentina gave definitive impetus to its research in the nuclear sector when it installed a reactor for the production of radioisotopes at the Constituyentes Atomic Center. Adm Castro Madero was appointed to head the nuclear program, and the next step was the construction of an electrical generator plant powered by atomic energy in Atucha.

Three years ago the Argentine government announced it had mastered the technology for enriching uranium, but after some research, the Brazilian authorities concluded that even though the Argentine research had been successful in laboratory tests, this process might still involve some problems if transferred to an industrial plant.

Although Brazil's National Intelligence Service (SNI) had established a whole structure to support the Brazilian-German Nuclear Agreement 10 years ago, the Brazilian military pursued their own research in the atomic energy field at the Sao Jose dos Campos Technical Aeronautics Center. However, at the beginning of the 1980s, the navy decided to transfer its research in this sector to the University of Sao Paulo, establishing closer relations with the Nuclear Research Institute (IPEN).

The change on which the navy decided was the result of a disagreement with the air force on the method of enriching uranium developed at the Sao Jose dos Campos Aeronautics facility, using laser beams.

The navy oriented its efforts toward the goal of building the so-called "compact reactor," which will serve as the propulsion mechanism for the first Brazilian nuclear submarine. The design for this vessel will only be completed during the first half of the coming decade, when the weapons systems, sensors and other electronic components designed for a naval warfare scenario as of the end of the century have been evaluated.

Argentina too is interested in a nuclear-powered submarine, but neither the Brazilian nor the Argentine plan calls for the installation of nuclear missiles on board these vessels.

Two of the four tasks which might be assigned to the Brazilian submarine fleet by the naval general staff could not be carried out without nuclear submarines. Such a plan would make Brazilian submarines responsible for:

1. Controlling the maritime trade routes of interest to Brazil;
2. Projecting the domestic military power on land;
3. Structuring the country's strategic deterrent force; and
4. Preventing any future enemy of Brazil from making use of the seas.

Without nuclear submarines, the task of projecting the national military power on land and ensuring a deterrent force would be jeopardized, in both cases by the lack of ballistic missiles equipped with nuclear warheads which could be launched from such vessels.

As the Brazilian naval effort is not in principle oriented toward a nuclear submarine equipped with nuclear weapons, the Brazilian plan will achieve the limited purpose of deterring any presumed enemies from making an armed attack on our sovereignty. The Argentines were able to confirm the importance of nuclear submarines during the Falkland crisis in the first half of 1982.

It was one of these vessels in Her Majesty's Navy which sank the Argentine cruiser General Belgrano in the bloodiest sea battle in the whole of the conflict. The Belgrano was the flagship of a small Argentine naval task force, and its sinking meant the end of almost all of the offensive missions of the fleet commanded by Adm Jorge Isaac Anaya. After this loss, the Argentine vessels limited themselves to unimportant coastal patrols which, carried out in shallow water, involved no risk of an encounter with a nuclear enemy.

After the war, Argentine naval officials admitted that they were unprepared for a confrontation with British nuclear submarines. Argentina was even uncertain as to what the consequences of a battle which might result in the destruction of a British submarine would be. Many people in Buenos Aires believed that such an incident would release radioactivity which would threaten the Argentine coast.

Moreover, both Argentina and Brazil considered developing missile units with nuclear warheads for practical and strategic missions. While the Argentines concentrated these studies in the army, in Brazil it is the air force which has been developing the vectors which would initially be capable of carrying a nuclear warhead.

The FAB believes that it has now achieved reasonable mastery of the technology of the solid propellants used in the scientific research rockets of the Sonda family, but it admits to encountering difficulties in the use of liquid propellants, which are much less stable and more powerful. In the army, there is doubt about the real Brazilian capacity even where solid propellants are concerned.

However, Brazil is farther ahead in the technology of missile production than Argentina. The Falklands war illustrated this. Neither the Argentine air-to-air missile project (the "Martín Pescador") and the missile designed for use on land (known as the "Mathogo") has yet developed beyond the prototype stage.

Although it is entirely oriented toward the Brazilian space program, which calls for its use as the launch vehicle for a Brazilian satellite, the Sonda IV rocket is the star of the domestic aerospace program today. Its conversion into a vector for the transport of a nuclear warhead would, however, entail the development of a so-called "guidance panel," the equipment which would make this vector into a "smart missile." The army, desirous of developing conventional missiles, has sought the technology for such "guidance panels" in

other countries. Recently, the minister of army, Gen Leonidas Pires Goncalves, has pursued talks in Sweden with a view to initiating cooperation to ensure the transfer to Brazil of Swedish experiments with a "panel" developed by the Japanese which would give the missile three systems for evading antimissile missiles. The Exocet, used with success by the Argentines in the Falklands war, has only one "evasion point."

However, fuels and the guidance panel are but two of the problems to be resolved in connection with the development of missile units with nuclear warheads. The problems in arming these warheads, as well as the installation of the missiles, which would require special silos in areas of strategic interest, have led the Brazilian authorities to conclude that the incorporation of these weapons in the domestic arsenal will not be possible until toward the end of the century.

Developing countries such as Brazil and Argentina, with limited military capacity even for purely defensive operations, encounter still another problem in connection with the use of tactical nuclear weapons. It is the development of a philosophy for the use of these weapons adapted to the real situation of two nations in the Third World, which are moreover located in a region geographically distant from the areas of East-West confrontation.

At the beginning of the 1980s, major American military facilities such as the Nuclear Defense Agency and the Army Research Laboratory in Alabama attempted to define the tenuous dividing line between nuclear weapons for technical use and nuclear weapons for strategic use more precisely. And this was in a country which was not only one of the three leading economic powers in the world, but was also the nation with the longest experience as a user of nuclear weapons.

The philosophy of use must be understood to mean the choice of a given type of nuclear weapons, their placement at a given point on the national territory, and a decision as to the purpose of their use--in other words, against what country use is planned. American studies today conclude that the development of a philosophy for the use of nuclear missiles takes 10 to 15 years. These same studies, moreover, have already led the American army to establish a methodology for the use of tactical nuclear weapons by units on the brigade, and even the battalion, level.

Among the many problems involved in planning the use of tactical or strategic nuclear weapons, none is greater than choosing to engage in aerial bombing. A nuclear payload in the belly of an aircraft requires a military infrastructure which is simply unimaginable for two nations such as Brazil and Argentina, which have armed forces suited only to what is known as "limited warfare," that is to say that in which the major powers and their formidable arsenals are not involved.

Argentina came to have a strategic air force, but this was in the postwar period, when it purchased some old four-engine British bombers. A strategic force no longer requires a "flying fortress" (the name the Argentines pompously gave their rickety two-engine "Pucara" fighter) or the B-52s, which were famous in the days of the so-called "cold war." But although the size of

airplanes has been reduced, their destructive power and their electronic equipment have reached levels of sophistication which exclude any possibility of improvisation.

Long before they have an atomic bomb, Argentina and Brazil need to develop their armed forces in the realm of electronic warfare and satellite communications, which are absolutely vital in today's conflicts. For a country such as Brazil which still has difficulty assigning its army units--conventional, obviously--in suitable fashion, or a nation such as Argentina, whose army has never studied land warfare in island areas, despite the raging national passion concerning the Falkland Islands, the use of nuclear weapons seems too great a leap.

However, it is necessary to note the determination of these two countries to maintain an independent position on the nuclear issue. It is this which has led them to refuse systematically to sign the Tlateloco Treaty on the nonproliferation of nuclear weapons in this part of the world, and it is this which has also led them to ignore certain evidences of fear on the part of the State Department whenever the issue of the development of their armed forces in the atomic field has come up.

Unfortunately for the American diplomats, a country as vast as Brazil has, as might well be imagined, reasonable uranium reserves in its subsoil. In only two municipalities in Brazil--Itataia, in Ceara, and Lagoa Real, in Bahia--there are almost 245,000 tons.

Brazilian-Chinese Agreement

Sao Paulo TECNOLOGIA & DEFESA in Portuguese No 31, 1986 p 24

[Article by Paulo Mena Barreto]

[Text] Brazil and China have signed an agreement for cooperation in the aerospace field involving the Chinese Central Space Agency and the Technical Aerospace Center, through the Aerospace Research Institute. The agreement, on which preparations began in 1982 and which was signed by the director of the CTA, Brig Gen Hugo Piva, at the end of 1983, covers an exchange of fuel technology and guidance systems in the civilian and military sectors.

Basically, the Chinese are interested in Brazil's solid fuel technology, one of the best alternatives in existence for military use. Currently, the whole of Beijing's deterrent force is designed for the use of liquid fuel, despite all the difficulties in handling and storage this entails.

Apart from the purely practical factors, there is another of a strategic nature which should not be overlooked. The reaction time for a missile with solid fuel only half that of a missile with liquid fuel. This fact could mean the vital difference in whether or not a nuclear umbrella has credibility.

On the other hand, the Chinese technology in microelectronics ranks among the most advanced in existence today. In the field of data processing, an essential tool for success along new military or civilian paths, Brazil has

better mastery of the manufacture and structure of computers and digitalized components. The two fields complement one another, and the scientists and military leaders in the two countries were not slow to understand this fact.

This microelectronic technology is seen in better and lighter guidance systems. Brazil's greatest interest is in the design and manufacture of control panels for missiles, an alternative which depends on a step to be taken by Argentina or South Africa.

Another advantage for the Brazilians would be the development of the new satellite-launching vehicles. The Chinese liquid-fuel rockets are among the best available on the international market. It would be well to recall that after its third consecutive failure following the Challenger mission, NASA, in the United States, turned to People's China when it needed to launch another civil communications satellite.

The VLS developed on the basis of the Sonda IV could serve as the foundation for an excellent strategic ballistic missile, but as a space rocket, it will always have limitations in force and thrust which will not easily be resolved. The only alternative to a liquid-fuel rocket would be to equip the VLS with dozens of auxiliary rockets, a clumsy and heavy business, as well as hardly reliable.

Even if Argentina and Brazil do not have their bombs, it will be necessary to develop an advanced space program capable of managing the animal, vegetable and mineral wealth of the country. This aspect alone justifies the agreement with China, apart from the clear benefits offered to the Brazilian military programs.

5157

CSO:5100/2012

BRAZIL

NUCLEAR PROGRAM LOSES 'PRIORITY' IN BUDGET CUTS

PY231807 Paris AFP in Spanish 0121 GMT 22 Oct 86

[Text] Rio de Janeiro, 21 Oct (AFP) -- Brazilian Mines Minister Aureliano Chaves today said to the local press that the nuclear program has not been granted a priority status in the 1987 Brazilian Government budget.

Chaves made this statement during a meeting with Nuclebras [Brazilian Nuclear Corporations, Inc.] Director Ronaldo Fabricio, who resigned his post because of budget cuts to the 1987 nuclear program.

Chaves said that he cannot pressure ministers in the economic sector to hand over nonexistent resources. He added that because of a lack of resources, the government query has established priorities for its investments, and the nuclear sector is not among them.

Chaves said that the Brazilian nuclear program will not be paralyzed but he added that the implementation of the program will be compatible with the resources available.

Ronaldo Fabricio said that the Angra II nuclear plant, the first in a series of eight plants scheduled to be built within the framework of a 1975 agreement signed with the FRG, will not be operational by 1992 as was scheduled, due to the resources that the national budget has allotted to the nuclear sector in 1987.

According to Fabricio, in 1986 we worked at a slow pace because of budget cuts in the nuclear sector which decreased from \$230 million to \$120 million.

The Brazilian nuclear program, which is conducted within the framework of an agreement that was signed in 1975 with the FRG, has been virtually paralyzed since the beginning of 1984 because of budget cuts in the public sector.

This agreement provides for the installation in Brazil of eight nuclear plants of 1.3 million kilowatt power each for the production of electricity. It also provides for the transference of technology to carry out all the necessary operations for prospecting, extracting and production of uranium, for the construction of an uranium enrichment plant, and for the construction of a radioactive fuel reprocessing plants.

The original Brazilian nuclear program established that the eight plants would be operational by 1990, but because of the modifications that were recently established by the Brazilian Government, there will be one plant operational by 1992 and other one by 1995. [as received]

The Brazilian Government has not yet decided whether the other six plants provided for in the nuclear program, in which \$4.828 billion have already been invested, will be built.

BRAZIL

TECHNICAL, SCIENTIFIC BLOCKS TO ATOMIC BOMB PROJECTS LISTED

Rio de Janeiro O GLOBO in Portuguese 31 Aug 86 p 41

[Article by Denise Lima]

[Text] Sao Paulo--Still far from being able to develop a national technology for building nuclear plants, Brazil--at least officially--cannot even think of building an atomic bomb. That is the opinion of famous physicists such as Ivan Cunha Nascimento and Oscar Sala, director and vice-director, respectively, of the Physics Institute of the University of Sao Paulo (USP), and Claudio Rodrigues, the superintendent of the Institute of Energy and Nuclear Research (IPEN).

The fact is, however, that the subject of nuclear energy is out on the street; it arouses the curiosity and the fear of the people, nurtured by unpleasant situations such as the leakage from the Three Mile Island plant in the United States and Chernobyl in the Soviet Union. At home, many things ended up being labeled as rumors, but there are those who remember the plutonium that allegedly went directly from the IPEN to Iraq during the Maluf government and, more recently, the preparation of a military area in Serra do Cachimbo in Para intended for nuclear testing--everything duly denied.

Since the U.S. research in New Mexico and Hiroshima, of sad memory, a stigma has attached to a whole technology that can also lead the world not to a third (and final) war but, paradoxically, to a revolution for peace, contributing to the survival of mankind.

The quest for national capability in the area of nuclear technology has been the challenge of the IPEN, which marked 30 years of existence this month. "But always for peaceful applications," stressed its superintendent, Claudio Rodrigues. He discounted any plans for an atomic bomb.

"We have neither the material nor the human resources. Although the bomb is a political decision, the technical-scientific aspect does not permit us to build it. The material we have is not even sufficient to obtain Isotope 235. The uranium enriched in Resende is not even enough for Angra's needs. It is a case that requires technology and money," he declared.

Rodrigues admitted, however, that if the government had released funds during all these years, research at the IPEN would now be at more advanced stages, as is the case in Argentina, which began well after its studies. Even so, he believes that it will be possible to build a national reactor within 10 years, although with less power than those of Angra I and II. He expects independence in the area of classic energy (for peaceful purposes) will be achieved in a "reasonably short" time if the nuclear program is adapted to national needs.

The production of reactors is the IPEN's great goal and its engineers are working on a project of a so-called "critical" unit--that, that does not generate--intended for new research. The institute has already achieved the purification of uranium through sulfur hexafluoride after a lengthy effort on the development of fluorine technology, which Brazil did not have until about 8 years ago.

The IPEN has been encountering difficulties in obtaining U.S. fuel for its reactor--the first one installed in Brazil--since the Carter administration and decided to produce it. A program established for that purpose has existed for approximately 4 years. The two fuel elements that have been fueling the reactor since last year were processed there.

The raw material--enriched uranium powder--comes from abroad, supplied by the International Atomic Energy Agency. Under the coordination of the National Nuclear Energy Commission (CNEN), its experts have been researching all of the uranium enrichment processes, which in the long term may also provide autonomy in that stage. Superintendent Claudio Rodrigues declared that there is great concern about the safety factor (there 's even a specific board) and about the training of human resources "directed toward national needs, both in community support activities and in the area of research."

In the work directed toward the community, the IPEN especially targets the areas of health, industry, and agriculture, supplying radioisotopes throughout Brazil. For medical purposes, they are applied in cancer therapy and even for the diagnosis of cardiac and cerebral problems. But the institute is also working with radioactive sources for gamma radiography (testing of turbines, piping) and the application of radiation to electrical cables, under factory orders, which this month amounted to more than 500 kilometers. Much nuclear energy research is being conducted in Brazil at the present time but little within the universities, in the opinion of Professor Oscar Sala, vice director of the Physics Institute of the USP. For example, Campinas State University has suspended development of the project for isotopic separation or uranium enrichment through the application of a laser to sulfur hexafluoride. The studies that had been carried out since the early seventies were turned over to the Advanced Studies Institute of the Aeronautics Technology Center and then to the IPEN after the death of its coordinator, physicist Sergio Porto in 1979.

likewise, in the USP in Sao Carlos and Ribeirao Preto, there is no nuclear physics research, properly speaking, but parallel work. Many studies were abandoned due to the lack of appropriations from the National Nuclear Energy Commission since the political decision not to install any more nuclear plants in Brazil.

The greatest enthusiasm for that research occurs in the capital, and physicist Ivan Cunha Nascimento, director of the Physics Institute of the USP, views the Navy's interest in building a nuclear submarine as an important step. The only thing is that the vessel's reactor has to be small and consequently use highly enriched uranium, which cannot be obtained through the process currently being used. This is a task that will require much study.

Oscar Sala, a member of the Commission for Evaluation of the Nuclear Program, which suggested the completion of the Angra II and III plants, emphasized the importance of the new reactor that is being built at the IPEN, even though of low power; but he discounted, at least in the short term, the possibility of achieving a national nuclear plant project.

"We would have to have project engineering and Brazil does not yet have the necessary conditions. That is going to depend on an explicit political option and may be 10 years away. As for the atomic bomb, the prospects are more remote and I hope that we will never be in a position to achieve it," he declared.

Nevertheless, in Sala's opinion, the mastery of nuclear technology is irreversible. But, as he noted, it is necessary to eliminate negative points, "especially as regards safety, because there are risks as in every new technology."

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CSO: 5100/2005

BRAZIL

CNEN DEATHS PROBED; RESEARCH ACTIVITIES DESCRIBED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 24 Sep 86 p 14

[Article by Jose Roberto Arruda]

[Text] Has the parallel nuclear program already caused the death of six persons by cancer due to exposure to radioactivity and the bad working conditions? To respond to that question, the chairman of the National Nuclear Energy Commission (CNEN), Rex Nazare Alves, created a 12-member task force comprised of doctors and specialists in labor medicine and ergonomics for the purpose of presenting, within 30 days, a statistical survey of the work ailments acquired by CNEN employees during the past 10 years.

The CNEN Employees' Association (ASSEC), which made the accusation about those deaths and has instituted legal actions in the labor courts--which are proceeding in the 5th, 7th, 8th, and 10th Federal District Courts--deplores the fact that it was not called upon to participate in the task force. The ASSEC is also asking for the immediate division of the CNEN, as was proposed by the commission of scientists that evaluated the nuclear program, to prevent fuel cycle research activities from continuing to operate in conjunction with those of a simple licensing and inspection bureaucratic agency, since the laboratories and reactors do not offer the necessary protection and safety.

The ASSEC suspects that from 1982 to last year six persons died in the Nuclear Engineering Institute (IEN) on Furdao Island and that those deaths may be associated with their work routine. Three other, not yet fatal, cancer cases appeared at the IEN last year. Those who died were: Tome de Menezes, Waldemiro de Souza Leite, Haroldo de Oliveira Borges, Carlos Augusto Camacho, Josefa Emilia da Silva, and another person named Higino whose full name the technicians could not recall during the interview. The common link in the investigation the ASSEC is conducting on its own is that, in one way or another, the six worked on the Argonauta reactor; Higino and Haroldo de Oliveira Borges only on the installation of that reactor.

Josefa Emilia da Silva was the charwoman who cleaned the rooms of the IEN and the Argonauta reactor room. Haroldo used aniline, a highly carcinogenic substance, in his work making printed circuits for TV and electronic instrumentation in the nuclear area. After he died of cancer, he was replaced in that

job by Higino, who died a short time later. The third person in the IEN Department of Instrumentation and Control, who replaced Higino, also contracted cancer and is undergoing medical treatment.

The ASSEC is demanding a broad survey of the working conditions of all the workers at IEN, the Institute of Radiological Protection and Dosimetry (IRD), the Institute of Energy and Nuclear Research (IPEN) of Sao Paulo and the headquarters of the National Nuclear Energy Commission itself. According to the CNEN Employees' Association, that survey would have to be conducted by a neutral, independent team that will have access to the medical files, that can compare them to the operational files, that will conduct some parallel investigations and try to identify anomalies that have been pointed out for some time by the employees.

The ASSEC does not believe that a medical team comprised of employees of the CNEN itself will have the necessary impartiality to act because the CNEN management treats that case as if it were a simple wage demand, a struggle for hazardous duty pay differential, when the ASSEC's struggle--besides that pay differential--is for better safety conditions on the job. The ASSEC believes that its colleagues in that task force may be subjected to coercion.

In the event that that task force is maintained, the ASSEC wants to participate in it and suggests some investigative methods. For example, that an inventory be made of all radioactive substances or chemicals harmful to human health commonly used in the work place; that a broad survey also be made of the storage conditions of those materials (including cobalt, cesium, radium, beryl, iridium, thorium, uranium, and very dangerous chemical substances); and that an investigation be made of whether international safety standards for handling them are being observed.

Contradiction

The ASSEC shows that there is a very great contradiction stemming from the fact that the CNEN is its own inspector; that is, that the supreme agency charged with radiological protection and safety does not adopt safe, effective, and modern methods in its own shop. So how can it oversee the other agencies that operate in the nuclear sector or that use radioactive products? ask the CNEN employees. Consequently, the CNEN Employees' Association is asking for the division of the agency in the manner proposed by the commission that evaluated the nuclear program, creating a National Radiological Protection and Nuclear Safety Commission, attached to the Presidency of the Republic, for the licensing and inspection regulatory functions currently exercised by the CNEN, Sipron and Copron. At the same time, a National Nuclear Research and Development Commission would be created to manage the parallel program, which could be attached to the Ministry of Technology or the Ministry of Mines and Energy.

That demand is based on the fact that research to develop the fuel cycle technology is conducted in all of the institutes connected with the CNEN. In all those places, there are badly installed laboratories, reactors, and radiating materials that are not always being handled with the necessary

safety precautions. People from the bureaucratic sector pass through those places and are not always aware of the danger they are running and what is the best way to protect themselves radiologically. Added to that is the fact that the CNEN is its own inspector and that in those years of authoritarianism and the fact that it conducts research in the nuclear sector, its employees cannot talk [as published].

Operating in the IEN in addition to the Argonauta research reactor is a cyclotron, a particle accelerator that produces radioisotopes for medicine, agriculture, and industry. The employees allege that that cyclotron has been working almost continuously, without interruption, on the production of radioisotopes. Thus, radioactivity at that site reaches high levels. Two or three days' of complete stoppage of the cyclotron's activities are necessary to clean it, but that is not being done. They are doing the cleaning with the cyclotron in operation, using one employee for a few minutes, then replacing him with another, and so on, to reduce the level of exposure. The IEN employees are alarmed over this.

The IEN is also developing a fast-breeder reactor project, with experts sent to Italy and the purchase of \$15 million worth of equipment, basically experimental cooling circuits and 12 tons of liquid sodium. It is carrying out a small research reactor project and a chemical uranium enrichment process along the same line as a method of uranium enrichment successfully developed by the Japanese Government. The IEN also makes analyses of radioactive minerals.

The Institute of Radiological Protection and Dosimetry (IRD), on the Avenue of the Americas, Tijuca Bar, is developing a laboratory-scale process for separating UF₄ (uranium tetrafluoride), conducts the environmental monitoring of Pocos de Caldas and the Admiral Alvaro Alberto nuclear complex, and examines imported food to measure radioactivity from the Chernobyl accident in the Soviet Union. Thus, it has a chamber of sources of radioisotopes, with sources of neutrons and other radioactive materials used to calibrate sensors, detectors, and dosimetric testing.

The National Nuclear Energy Commission also has experts and scientists working in the Army Technological Center (CETEX), in Marambaia Marsh, where research is being conducted with a graphite-moderated, gas-cooled, plutonium-generating reactor, in addition to continuing research with ultracentrifuges for uranium enrichment in the Institute of Energy and Nuclear Research in Sao Paulo.

The task force appointed by the chairman of the CNEN, Rex Nazare Alves, is headed by CNEN doctor, Manoel da Nova Castello Branco, and comprised of the following members: Armando Silveira Mello (CNEN doctor), Diana Maria Tavares Campos (IRD doctor), Fernando Pontes Moreira (IEN doctor), Florentino Neves Pereira de Macedo (CNEN doctor), Francisco Laecio Lins (IRD doctor), Jesse James Gomes da Silva (IEN researcher), Marcos Schuetz Jardim (IEN doctor), Narcisio Guedes (IEN doctor), Nilson Reis Cardoso (IRD doctor of labor medicine), Paulo Goncalves da Cunha (IRD researcher), Yannick Odetes Jacqueline N. Gomes dos Reis (IRD researcher).

Even if ASSEC--an organization that embraces 80 percent of the employees of the CNEN and the other affiliated agencies--should be invited to participate in that task force, it will continue its own investigations. It is going to send questionnaires to all [employees] and ask for the monitoring of everyone who deals with radioactive sources, as well as proceeding with its legal actions in the federal courts.

Physicist Denies Risk to the Environment

Nuclear physicist Ruth Klawns, a CNEN aide, said in the governor's palace yesterday that "the construction of the plant itself impedes the escape of radioactive material into the environment because there is a system that controls the nuclear plant which acts as a barrier to that material." With regard to accidents, she said that, in the short period that it remained in operation, the Angra dos Reis nuclear plant has already had eight "unusual incidents," which are internal problems related to its reactor but which did not become serious situations. In the meantime, CEDEC is prepared to reformulate its emergency plans.

8711/8918

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BRAZIL

POSSIBLE RADIOACTIVE WASTE DUMP SITES CHOSEN

PY211155 Rio de Janeiro O GLOBO in Portuguese 18 Oct 86 p 16

[By Paulo Motta]

[Excerpts] From the 17 areas initially considered, the National Nuclear Energy Commission (CNEN) has already chosen 5 for the final storage of atomic waste from the Angra 1 nuclear plant. These areas are located in regions receiving little rain and having small population in northern Rio de Janeiro (1), Minas Gerais (1), Bahia (2), and Pernambuco (1). The so-called "prospective areas," which add up to 11,500 square kilometers have already been staked out in those regions. The atomic waste may also end up on the bottom of the ocean or on the Martim Vaz and Trindade Islands.

Other states that have possible areas that could serve as atomic waste dumps are Paraiba, Rio Grande do Norte, Ceara, and Piaui. However, "prospective areas" have not yet been staked out in these states. Three locations off the coast of the southern and southeast regions of Brazil have already been chosen as possible underwater dump sites. The CNEN will now make a detailed study of those areas, and in 4 years, intends to submit to the federal government three areas that fully meet all the requirements for atomic waste dumps. The final decision will be a political decision, but, in compliance with President Sarney's directives, the population and authorities of the states, as well as the scientific community, will be consulted.

The search for atomic waste sites began in 1978, but it was only 2 years ago that the effort was made in earnest. Following methods used by the U.S. Nuclear Regulatory Commission and recommendations from international organizations, such as the International Atomic Energy Agency, a group made up by geologists, two meteorologists, a hydrologist, and a geographer began to survey the entire country, following criteria based on environmental, economic, engineering, land use, social, and institutional factors.

The three areas being considered for underwater disposal of atomic waste are located off the Sao Paulo coastline, 300 km from Angra dos Reis, at a depth of 3,800 meters; on the same latitude, 900 km off the coast, 4,800 meters deep; and off the coast of Santa Catarina and Rio Grande do Sul, 1,200 km from Angra dos Reis, at a depth of 4,000 meters, in the central part of the Rio Grande submarine height. The CNEN will drop containers on the first two sites to test the effect of corrosion and the resistance of the material to pressure.

/12232

CSO: 5100/2024

BRAZIL

ANGRA I FACES ONGOING OPERATING PROBLEMS

PY221833 Rio de Janeiro O GLOBO in Portuguese 19 Oct 86 p 29

[by Paulo Motta]

[Text] Despite the fact that it began to operate commercially in January 1985, the Angra I nuclear plant has already had to change the 48,000 rods on its steam condensor (one of the factors that caused it to close down in January of that year), and now it will have to change the system that it uses for storing radioactive waste. The purchase of the new equipment alone (excluding the cost of installation), will cost approximately \$6 million (84 million cruzados).

The rods had to be changed because they were corroded and covered in barnacles. Furnas technicians at that time stated that the chemical treatment used by Westinghouse in the steam generator caused the corrosion. Other experts have guaranteed that the problem was caused because the U.S. enterprise had planned that the plant would use fresh water in its refrigeration system (like many plants use in the United States), but sea water is used here in Brazil.

The system for storing radioactive waste will have to be changed because the current system dates from the 1960's. Since that time, this sector has developed greatly and the radioactive waste produced at Angra I does not comply with the standard guidelines of the IAEA nor of the National Nuclear Energy Commission (CNEN)

The so-called low and medium-activity system of stabilization of radioactive waste [sistema de imobilizacao dos rejeitos radioativos de Baixa e Media atividade] of the Angra I plant is really a process through which nuclear waste is placed in drum cylinders for their future final storage in a deposit to be built by the CNEN. Before it is placed in drums, the radioactive material is mixed with concrete and vermiculite so as to avoid leaks of radioactive waste. Nevertheless, the system used by Angra I is outdated and it does not meet the present IAEA or CNEN specifications.

Alfredo Trajan Filho, chief engineer of the Furnas power plant division, recently admitted that the company did not replace the nuclear waste processing system within the deadline established by CNEN. He explained that the difficulties of adapting a new system to the present processing equipment. According to the CNEN, the system should have been replaced within a 2-year period after the plant entered a critical state, which occurred in March 1982.

Trajan reported that since we were unable to meet the deadline, we built a temporary deposit to store radioactive waste. This was done in compliance with CNEN and national and international security measures. The present stages of storage of radioactive waste are perfectly safe and safeguards the environment, the population, and plant employees. We have already bought a new processing system. Its cost totals \$400 thousand and it will be in operation by the end of next year.

Trajan added that the new unit will yield a smaller volume of nuclear waste than produced by the present system. He said that the present temporary deposit that was built near Angra I has a capacity to store 4,000 barrels of nuclear waste of low and medium activity and that it can store Angra I nuclear waste for 3 or 4 more years.

/9716

CSO: 5100/2028

BRAZIL

URANIUM RESERVES ESTIMATED AT 300,000 TONS

PY211335 Paris AFP in Spanish 2219 GMT 20 Oct 86

[Text] Rio de Janeiro, 20 October (AFP)--It was officially reported in Rio de Janeiro today that the Brazilian uranium reserves, which were checked by geologists from the state-owned enterprise Nuclebras, are estimated to be over 300,000 tons.

In statements published in the NUCLEBRAS BULLETIN, Nuclebras President Licinio Seabra added that the probable Brazilian uranium reserves range from 1 million to 2 million tons.

According to Seabra, 300,000 tons of uranium would permit 14 nuclear power plants of 1,300,000 kw each to generate electric power for 30 years.

In addition, Seabra said that as a result of budget cutbacks, implementation of the Brazilian nuclear programs' uranium prospecting activities have been paralyzed.

The Brazilian nuclear program, which is being implemented within the framework of an agreement signed with the FRG on 27 June 1975, has virtually halted since early 1984 as a result of a cutback on public expenditures.

Two of the eight 1,300,000 kw-nuclear power plants which were scheduled to be built in Brazil through 1990 with FRG technology, will become operational in 1992 and 1995. However, the date for building the other six nuclear power plants has not been set.

/12232

CSO: 5100/2024

BRAZIL

BRIEFS

SEABRA ON INADEQUATE FUNDS--The president of NUCLEBRAS, Licinio Seabra, yesterday told Minister of Mines and Energy Aureliano Chaves that that company's situation is dangerously approaching the "point of exhaustion" because of the lack of definition by the Planning Secretariat of appropriate sources of funds necessary for its survival and fulfillment of the minimum nuclear program. NUCLEBRAS does not have its own funds, depending entirely on the National Treasury or the international banks for its operation. In order to proceed with the schedule decided by President Sarney on 6 August, to build Angra II by 1992 and Angra III by 1995, it would be necessary to apply 1.66 billion cruzados "as quickly as possible." [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 9 Sep 86 p 40] 8711/7051

SABOIA ON IPERO INSTALLATION--Brasilia--"The Navy does not produce fuel for its conventional propulsion units and it is not going to produce it for its nuclear propulsion programs. The Ipero facilities will serve only to house a prototype reactor similar to the one that will be used in our atomic submarine." That is how Navy Minister Henrique Saboia reacted to the reports that the Navy had installed a uranium enrichment plant in Sorocaba. "I never made a secret of the Brazilian Navy's intention to build a nuclear submarine," declared the minister. "But that is a long way from what appeared in the press. I will not speak about uranium enrichment because that does not fall within the purview of my ministry." On the other hand, the nuclear submarine would also be a long-range goal. "We are developing everything," he said. "Nobody provides anything in that sector and we are starting from zero in our research. Every time we buy something abroad, they are going to relate it to the nuclear submarine project." [Text] [Rio de Janeiro O GLOBO in Portuguese 6 Sep 86 p 16] 8711/7051

CSO: 5100/2005

BANGLADESH

REPORTAGE ON ACTIVATION OF SAVAR RESEARCH REACTOR

AEC Chairman's Remarks

Dhaka THE NEW NATION in English 15 Sep 86 pp 1, 8

[Text]

Bangladesh entered the nuclear age yesterday with successful switching on at 10-30 a.m. of a three megawatt research reactor at Savar, twelve miles from the capital.

Chairman of the Atomic Energy Commission Dr Anwar Hossain said this event marked the beginning of a new era in the country's nuclear plan for peaceful uses.

The TRIGA reactor has been procured from the United States from the country's own resources. Fifty per cent of its installation work was done by the local scientists and engineers.

While the plant will be the basis for preparing the country for future nuclear power programmes and provide opportunities to the scientists and engineers for research work, it will produce radio isotopes used for improvement and quality control in the fields of agriculture, industry and health.

Such research reactor was first installed in the world in 1942 in Chicago and among the neighbouring countries in 1957 in India and in 1965 in Pakistan.

Plan for a nuclear power plant at Rooppur was first conceived in 1964 but it did not make any headway mainly because of political decision.

Work on the research reactor at Savar started when late President Ziaur Rahman gave the go-ahead in 1978.

Bangladesh has already signed nuclear non-proliferation treaty expressing her intention of only peaceful application of atomic energy.

The Chairman of the Atomic Energy Commission assured that the research reactor would not pose any safety problem or health hazard to the workers and the public during normal operation and even in the highly unlikely situation of a mishap. It can be controlled using five safety and control rods which contain neutron absorbers.

The high negative temperature co-efficient of the zirconium hydride fuel makes it an inherently safe reactor, he added.

Dr Hossain further said the safety aspect had been thoroughly examined by a committee consisting of eminent scientists and engineers. Safety aspects would also be thoroughly monitored by experts from the International Atomic Energy Agency of which Bangladesh is a member.

He stressed the need for nuclear power plant for the country to resolve the power crisis which retarded the economic progress.

Dr. Hossain estimated that a three hundred megawatt nuclear power plant as envisaged for Rooppur would now cost around six hundred million dollars or 1800 crore taka and it would take seven years to complete the project.

Turning to the research reactor, Dr. Hossain noted with satisfaction that the initial criticality was achieved with 90 standard fuel elements including five safety and control rods in fully withdrawn position having a total of 25 kilograms

of 19.9 per cent enriched uranium.

The entire cost of the reactor and associated facilities amounting to Tk 18 crore including Tk. 12 crore in foreign exchange was financed by the government from its own resources.

It was procured from the General Atomic Company of the US which also shared the installation work.

Dr Hossain said the reactor would be a source of neutrons and Gamma-rays which had a wide range of applications in the fields of radioisotope production and applied research. It would help in establishing a scientific and technological base in nuclear science and technology in the country. This would be a back-up facility in order to prepare the country for future nuclear power programmes. The country's nuclear scientists and engineers would be trained utilizing the facilities in and around this reactor.

He further said research reactor was a useful tool for production of radioisotopes, especially the short-lived ones. At present radioisotopes were being imported for use in nuclear medical centres for diagnostic and therapeutic purposes. Local demand for all short-lived would be met from this facility. Radioisotopes to be produced from this reactor would also be utilized in agricultural research, in industries and in various other sectors of the economy.

Construction of the reactor building began in 1981. The

around the reactor tank was constructed in 1964 using locally available ilmenite and magnetite which were processed at the Atomic Energy Commission's Beach sand Pilot Plant at Cox's Bazar, thus saving a substantial amount of foreign exchange. The mechanical and electrical installation works were completed last year.

The final installation and testing of control system started in July last, fuel loading on September 13 and the criticality was achieved yesterday.

Dr Hossain and his colleagues stayed overnight at the site to achieve the goal.

The reactor will, however, be formally commissioned sometime in December next.

Among the scientists and engineers associated with the project and present at the switching on ceremony were Dr. M.A. Mannan, Dr. Mir Mohtarraf Hossain, Mr. K.A. Haque, Mr. M. Emdad Hossain, Mr. D.G. Acre (of General Atomic Company) and Mr. Moazzem Hossain.

Turning Point for Country

Dhaka THE NEW NATION in English 18 Sep 86 p 5

[Editorial]

[Text]

The inauguration of a three-megawatt nuclear research reactor at Savar the other day marks a turning point for the country in that it brings the nation in direct contact with the possibilities offered by nuclear science. The reactor, procured with local resources, is expected to be the basis of all nuclear power programmes in the future. It may be mentioned here that in the aftermath of the plans made regarding the Rooppur nuclear power plant as far back as 1964 and their consequent non-fulfilment, work began on the Savar reactor in 1978 with a view to facilitating scientific research through such means as radio isotopes. Such developments, it is widely felt in the light of the uses to which nuclear energy has been put in other parts of the world, will contribute to the growth of such vital activities as health, agriculture and industry.

The reactor at Savar, set up at a cost of Taka eighteen crore, possesses the ability to produce neutron and gamma rays that have a great deal to contribute in the fields of radio-isotope production and applied research. Since the overall purpose of the national nuclear programme is to use it for peaceful purposes, it is only natural that the Savar reactor marks the first step towards providing the nation's scientists with facilities that till now we have had to import. Radio-isotopes, to cite

an example, noted for their diagnostic and therapeutic values, are now expected to be produced locally now that the Savar reactor has been established. While the reactor symbolises an important step in technology for us, there is also the vital issue of the safety factor that has to be considered. Indeed, it is only proper, after what one has experienced about Bhopal and Chernobyl, that such questions should be there. The Chairman of the country's Atomic Energy Commission has asserted that the safety factor has been thoroughly assessed and will be examined periodically by experts of the International Atomic Energy Agency.

The Savar nuclear reactor, it is our considered opinion, fulfils a vital technological need for all of us here in Bangladesh. On the one hand, it formally launches us, in however minor a form, into the nuclear age; and, on the other, it opens up a wide range of developmental prospects for the nation. It is our expectation that when the reactor is formally commissioned later this year, we can truly look forward to constructive times. Being a signatory to the nuclear non-proliferation treaty, Bangladesh has made her intentions clear—and those are basically to pursue a nuclear policy geared to peaceful uses. The reactor at Savar, one notes, should exemplify just such an objective of our policy.

/9274

CSO: 5150/0032

INDIA

DEFENSE EXPERTS; U.S. BLIND TO PAKISTAN BREAKING RULES

Bombay THE TIMES OF INDIA in English 17 Sep 86 p 9

[Text]

NEW DELHI, September 16
(PTI).

THE U.S. has turned a blind eye to Pakistan's nuclear weapon programme knowing fully well that Islamabad is violating earlier assurances, according to experts of the Institute of Defence Studies and Analysis here.

They said that in mid-1984, the U.S. President, Mr. Ronald Reagan, wrote to Gen. Zia that the U.S. aid would be cut off if Pakistan raised the enrichment level of uranium above five per cent.

This was one of the four conditions imposed on Pakistan for continued aid. The others were non-reprocessing of enriched uranium, non-fabrication of nuclear device and no open test of nuclear weapons.

The experts said there is enough evidence to prove that Pakistan has not only increased its enrichment capability but also raised the level of enrichment to 30 per cent.

Instead of putting pressure on Pakistan to slow down or halt, they said, the Reagan administration has now given a permanent waiver by signing an amendment enabling continued U.S. aid to Pakistan regardless of its progress in the nuclear weapons programme.

The experts said Pakistan has no civil need for the uranium enrichment plant which began operating at Kahuta near Islamabad in 1984.

Atomic bombs can be made from plutonium collected during the reprocessing of irradiated uranium from a reactor, or from highly enriched uranium.

Meanwhile, "New Scientist", a leading British science magazine, quoting observers said the change of heart in

the U.S. is a tacit recognition that Pakistan now has the capability to build the bomb and that continued restrictions are pointless.

Quoting Mr. Abdul Quader Khan, an eminent Pakistan nuclear physicist, the "New Scientist" said enrichment of uranium is a Herculean task, the most difficult of the whole fuel cycle. Only seven or eight nations in the world have perfected it.

The western world could never imagine that a country like Pakistan could break their monopoly, Mr. Khan had said.

Experts here say that Pakistan so far has no nuclear power programme which requires enriched uranium as fuel. The only power reactor it has at Karachi is run on natural uranium.

Even in the near future, Pakistan atomic energy commission has no project to make use of enriched uranium other than military purposes, the experts added.

INDIA

SPENT FUEL BUNDLES REMOVED FROM KALPAKKAM REACTOR

Madras THE HINDU in English 29 Sep 86 p 1

[Text]

MADRAS, Sept. 28.

Engineers at the Madras Atomic Power Station, Kalpakkam, have made a breakthrough in their efforts to restart the 235 MW Unit II which was shut down six weeks ago after the two spent fuel bundles got stuck while being removed from the reactor.

Mr. M. H. P. Rao, Executive Director, Nuclear Power Board, told THE HINDU today that in a carefully planned remote controlled operation on Saturday night, the engineers managed to retrieve the two radioactive fuel bundles. These were put in a specially fabricated lead cast, sealed and then deposited safely in the spent fuel bay.

The reactor, which was unaffected by the incident, is likely to be started up in a week's time, Mr. Rao said.

The day-long operation had to be done by remote controlled machines, since the area had high radiation and was inaccessible to the staff. Mr. Rao said the task was accomplished smoothly without exposing the workmen to undue radiation.

However, much preparation was required. The lead-shielded cast was designed and fabricated specially for this operation and the entire procedure was rehearsed three times before it was tried out on the site.

First time: It was the first time that nuclear scientists in the country had encountered such a problem. In a reactor such as the one at Kalpakkam, the spent fuel bundles are removed from the reactor by a remote controlled fuelling machine which then pushes them into an enclosed chute that leads to the storage bay, about 80 metres away from the reactor.

This particular pair of fuel bundles imprecisely guided into the chute because of a faulty cable, got jammed and broke on impact.

The job of cleaning up the debris from the broken bundle began today and once this was completed, the reactor would be started Mr. Rao said.

While the repair operation has apparently not caused much expenditure in terms of equipment and material, the long shutdown has upset the nuclear station's output plans. This and the Unit I have had more than a fair share of problems this year. The generator transformers of the Unit I had to be replaced, there was a leak of radioactive heavy water from its reactor and there were failures in the heavy water pumps.

Power output in 1986-87 is expected to fall well short of the targeted 2,200 million units. Authorities hope they will be able to generate about 1,800 million units.

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CSO: 5150/0034

INDIA

BRIEFS

NUCLEAR SAFETY PROVISIONS--Vienna, 1 Oct--The Atomic Energy Commission Chairman, Dr Raja Ramanna, expressed India's disappointment that the convention on early notification of nuclear accidents, adopted at the special session of the International Atomic Energy Agency, did not cover all kinds of nuclear accidents. The special session also adopted another convention on assistance in the case of a nuclear accident or radiological emergency. The conventions were signed by India on Monday. Dr Ramanna said the convention should have covered accidents from whatever source, civil or military, including accidents from nuclear weapons or nuclear weapons tests, since their results would be equally damaging. Dr Ramanna said, "Nevertheless, we have decided to sign both the conventions in view of the solemn assurance that has been given by the five nuclear weapon States to the effect that they undertake to notify all accidents." "This is in keeping with our policy of according to public declarations of the State policy equal validity with other international commitments," he added. "While ratifying these conventions, it is our intention to indicate our reservations with respect to certain articles of the two conventions," Dr Ramanna said. Elected chairman: The IAEA conference opened on Monday with the election of Dr Raja Ramanna as chairman of the five-day meeting. His name was proposed by Bangladesh and supported by the U.S., Mexico, France, Poland, Indonesia, Tunisia and Japan. In his opening speech, Dr Ramanna said nuclear power would be the determining energy source of developing countries in the future. "Nuclear energy is the greatest value to development in the world," he said. "The accords we reached last week showed a spirit of cooperation that makes us confident for the future." [Text] [Madras THE HINDU in English 2 Oct 86 p 7] /9274

HEAVY WATER LEAK--Jaipur, 1 Oct--The second unit of the Rajasthan Atomic Power Project (RAPP) in Rawat Bhata near Kota had to be closed down on Monday night owing to leakage of heavy water from "the mechanical shield of the reactor's moderator system pump." According to the Chief Superintendent of the project, Mr Nadkarni, the second unit was in "continuous working condition for five months, but the leakage was noticed on Monday at about 9 p.m. and it was decided to close down the unit. A Rajasthan State Electricity Board spokesman in Jaipur, while declining to comment on the closure of the unit, said information about it had been received from Kota. [Text] [Madras THE HINDU in English 2 Oct 86 p 7] /9274

NUCLEAR PLANT GENERATORS--Tiruchi, 26 Sep--The Nuclear Power Board has advised the Bharat Heavy Electricals, Tiruchi, to take up straightaway the design technology for manufacture of steam generators for 500-mw nuclear power plants, Mr R. Ramakrishnan, chief executive, BHEL, told a press conference here on Friday. The nuclear power floor shop here was now busy working on this new design for higher capacity generators for nuclear power stations. The thrust would be on meeting the growing demands for waste heat recovery systems, power equipment for co-generation and combined cycle plants and valves for offshore oil drilling by the Oil and Natural Gas Commission. Apart from manufacture of valves for off-shore and onshore drilling for the ONGC, several facilities would be rigged up at the BHEL here and in a few centres nearer the drilling zones. The first offshore order, worth Rs 235 lakhs, for wellhead and X-mas tree valves had been received from the ONGC against a stiff global competition and would result in a saving of foreign exchange to the tune of the same amount of foreign exchange to the tune of the same amount as these had been imported hitherto. By supplying the special quality valves, the BHEL would also be instrumental in saving foreign exchange to the tune of Rs 125 crores during the Seventh Plan period. Already about Rs 600 lakhs was invested in introduction of modern manufacturing process and new products. It was proposed to spend another Rs 15 crores during the Seventh Plan period for capacity augmentation and modernisation of the valves department. Among the new products likely to be manufactured were quick non-return valves for extraction lines of turbines in power plants and special valves for use in the petroleum industry and cross country gas lines. [Text] [Madras THE HINDU in English 27 Sep 86 p 12]
/9274

CSO: 5150/0035

ISRAEL

BRIEFS

FRENCH REACTOR PURCHASE OFF-- Israel has dropped its plans to buy nuclear reactors from France because of the unprofitability of such an investment in view of the low price of other energy sources. Our economic affairs correspondent has learned that Israel is now looking into the possibility of involving its scientists in research on the latest generation of nuclear plants in various countries. Reacting to this report, a spokesman for the Energy Ministry said that Israel is leaving all its options open. [Text] [Jerusalem Domestic Service in Hebrew 0500 GMT 20 Oct 86 TA] /9274

CSO: 5100/4506

PAKISTAN

SPOKESMAN ON AFGHANISTAN, INDIAN NUCLEAR CAPABILITY

BK221636 Karachi Domestic Service in Urdu 1500 GMT 22 Oct 86

[Excerpts] The UN General Assembly is due to take up the Afghanistan question for debate on the 4th and 5th of next month. Foreign Minister Sahabzada Yaqub Khan leaves for New York on Monday [27 October] to lead Pakistan's delegation. A Foreign Office spokesman said in Islamabad today that it is Pakistan's hope and effort that the world body will once again endorse the resolution by an overwhelming majority so as to contribute to the building of an atmosphere which will lead to the end of the Soviet occupation of Afghanistan. The spokesman said only with the pull out of the Soviet forces from Afghanistan will there be a restoration of balance in the region.

Referring to the recent Reykjavik summit, the spokesman said it appears that there was no outcome of the talks on Afghanistan. Pakistan believes that the Soviet Union must be reminded on every occasion that a (?normal) situation in Afghanistan will be restored only if it ends the reign of sin and destruction in Afghanistan.

The spokesman said it is no secret that India is capable of producing nuclear weapons. This was stated by the Indian prime minister himself. It is also known to all that India has already produced 40 kg of plutonium. India will benefit remarkably from the manufacture of plutonium in years to come as the reactor in Madras also begins to manufacture plutonium which does not fall under any safety regulation.

The spokesman also said that visits by the naval ships of friendly countries to Pakistan is a normal thing. More than 80 naval ships including those from the United States, France, Britain, and Indonesia, had made friendly visits to Karachi harbor in the past. Referring to the criticism of the Government of India, the spokesman said not only does India provide facilities for visits by foreign ships but it has also provided permanent facilities for Soviet naval ships at Visakhapatnam port.

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CSO: 5100/4707

PAKISTAN

BRIEFS

KARACHI ATOMIC POWER PRODUCTION--The Karachi atomic power plant has produced more than 338,000 megawatts of electricity during the first 8 months of this year, which is almost a record. [Text] [Karachi Domestic Service in Urdu 0600 GMT 14 Oct 86 BK] /12232

CSO: 5100/4706

SOUTH AFRICA

STATE SPENDING ON NUCLEAR ENERGY CRITICIZED

Johannesburg THE ARGUS in English 11 Sep 86 p 4

[Text]

AN overwhelming proportion of State expenditure on energy research is dedicated to nuclear energy which has a limited role in South Africa now and an uncertain role in the future, said Koeberg Alert member Mr John Venn.

Mr Venn was delivering a paper entitled *Nuclear versus Renewables — A Misallocation of Resources?* at the Renewable Energy Potential conference at the University of Cape Town yesterday.

He said scientists had shown that South Africa's "real energy crisis" was in the rural and peri-urban areas where the population was dependent on renewable energy — mainly in the form of wood.

It was also "very clear" that projections of nuclear power made during the oil energy crisis in the 1970s would not be realised.

"It is surprising that South Africa continues to allocate far

more funds and effort to nuclear research and development than to other options, including renewable energy research."

R115-MILLION

Mr Venn said the total expenditure of the Atomic Energy Board rose from R8.5-million in 1970 to nearly R115-million in 1983.

After the establishment of the Atomic Energy Corporation in 1982, its budget rose from nearly R348-million in 1984 to more than R775-million for 1987.

About two-thirds of South Africa's population was heavily dependent on fuel wood, Mr Venn said. Current use of fuel wood was inefficient and of serious environmental concern because of the destruction of tree cover.

However, the total expenditure of the non-nuclear National Programme for Energy Research was "very small" — only R3 to R4-million.

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CSO: 5100/5

SOUTH AFRICA

RADIOACTIVITY LEVELS TESTED AT VAALPUTS

Cape Town THE ARGUS in English 18 Sep 86 p 21

[Article by John Yeld]

[Text]

EXHAUSTIVE field tests covering a wide range of environmental disciplines are being conducted at the Atomic Energy Corporation's (AEC) Vaalputs radioactive waste disposal site in the Northern Cape.

Dr Danie van As, manager of the AEC's isotopes and radiation department, told the Rad-waste '86 conference in Cape Town last week that an environmental monitoring programme had been established in November 1984 — two years before any radioactive waste was due to reach Vaalputs.

The area around the site had been divided into 16 sectors with monitoring points at one, three and 20 km distance, including 16 soil, 16 vegetation and 32 radiation monitoring points. Agricultural produce was also checked.

Evaporation

Because ground water was considered the most important potential pathway for radiation contamination, there were 106 water monitoring points, Dr van As said.

However, only a very small amount of rainfall was available to percolate through the ground level because of the extremely high rate of evaporation.

"We feel fairly confident we will not have any environmental contamination in this case (via ground water)," he said.

Professor Tony Hall, assistant curator of the University of Cape Town's Bolus Herbarium, said botanical research at Vaalputs looked at possible biological channels in plants for bringing radioactive material to the surface.

Likely management problems at the site included the appearance of deep-rooted weed species such as American mesquit whose roots could reach 18 metres — well beyond the two-to-seven metres of the waste burial trenches, Professor Hall said. Attention would have to be given to making the trench caps hard and impenetrable to roots.

Professor Hall said more was now known about plant ecology at Vaalputs than any other part of Bushmanland and he suggested the establishment of a permanent research station for long-term scientific studies be established there.

Professor Jan Nel of the University of Stellenbosch's zoology department said current baseline studies on rodents such as the Karoo rat could help determine any future population changes and abnormalities caused by radiation.

Possible interactions between the radiation source and animals was studied by plotting burrowing activities and measuring the amount of soil brought to the surface by rodents and insects such as harvester termites.

SOUTH AFRICA

BRIEFS

IAEA BREAKS OFF NEGOTIATIONS—The International Atomic Energy Agency (IAEA) has broken off negotiations with SA over application of safeguards to the uranium-enrichment plant at Pelindaba. The IAEA says SA recently proposed unacceptable conditions for inclusion in a draft safeguards agreement which had been prepared during earlier discussions. SA has never responded to IAEA calls to submit to full-scope safeguards agreements on all its nuclear plants. [Text] [Johannesburg BUSINESS DAY in English 24 Sep 86 p 1] /9274

CSO: 5100/5

SWEDEN

NUCLEAR FUEL PLANT PLANS UNDERGROUND RESEARCH, STORAGE LAB

Stockholm DAGENS NYHETER in Swedish 30 Sep 86 p 12

[Article by Ingemar Lofgren: "Nuclear Wastes Can Remain in Smaland"; first paragraph is DAGENS NYHETER introduction]

[Text] Svensk Karnbranslehantering AB [Swedish Nuclear Fuel Management Company] (SKB) will build an underground laboratory at Simpevarp, adjacent to Oskarshamn nuclear power plant. The laboratory is intended for research. It is possible, however, that it will later be used as storage for all highly radioactive waste in Sweden.

"If the bedrock at Simpevarp proves to be good, it will naturally be of interest in discussions about a future storage place as other places we have looked at have been," said Managing Director Sten Bjurstrom of SKB to DAGENS NYHETER. "But in principle it is too early to raise that question."

The construction of an underground laboratory at Simpevarp is a part of the research and development program which SKB turned over to the State Nuclear Fuel Authority yesterday. The program, which is the first since the law covering nuclear technology became effective in 1984, describes primarily what SKB plans to do during the next six years at a cost of about 600 million kronor.

The intent of the underground laboratory, which will be completed in 1992 at a cost of 175 million kronor, is that SKB will work further with research on the movement of ground water and the stability of the bedrock, among other things.

Knowledge

"Today we have rather broad knowledge of the bedrock and other factors which are important for final storage of nuclear waste," said Sten Bjurstrom. "But now we are at a stage where we want to summarize the knowledge, and we can do that best in an underground laboratory under real conditions."

The laboratory will be at least 400 meters deep, and during its working life, estimated at 20 years, it will have a permanent staff of 15 people.

According to Bjurstrom there are no mental reservations about the selection of Simpevarp. The laboratory could have been placed anywhere in Sweden where the bedrock consists of granite and gneiss.

"We have thoroughly examined and drilled in eight locations in Sweden. We have concluded that Swedish gneiss and granite are excellent for the storage of nuclear waste. As we will now build an underground laboratory, the bedrock must be reasonably representative of Swedish bedrock--and that is what we have in Simpevarp."

Drilling Completed

The eight locations where SKB has drilled to find a suitable storage site are Kamlunge, Gidea, Svartoberget, Finnsjon, Fjellveden, Krakemala, Klipperos and Starmo. None of these can be excluded as disposal sites for used Swedish nuclear fuel. It remains to be seen whether Simpevarp will be the ninth location.

According to SKB, drilling of the Swedish bedrock has been completed. Now it will be studied and summarized. In 1993 at the latest, two of the locations will be selected and investigated more carefully; not only geologically, but also in terms of population, transportation, etc. Then it will be up to the government to select one of them. That will take place in 1998.

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CSO: 5100/2407

TURKEY

BRIEFS

HAZELNUTS AFFECTED BY RADIATION--Hazelnut exporters have accused the government of acting "indifferently" about radiation. The president of the [Hazelnut Exporters'] Association Hakki Uzan said: "Why did they not warn us when Britain returned shipments of sage, anise and cumin 1 and 1/2 months ago because of radiation?" Uzan told UBA the following: "After the nuclear power plant incident [at Chernobyl] all produce containing radioactivity was destroyed in all European countries. The producer was compensated for that. Our government did not even warn the producers. It acted slowly and indifferently. The government is responsible for letting the radiation problem in hazelnuts to reach this stage. To expedite control we are going to import a radiation measuring device for 50,000 deutschemarks. If we lose the export season the Turkish economy would be hurt substantially." According to a report by our Giresun correspondent Mehmet Yuksel, Motherland Party assembly deputy Ahmet Yilmaz said: "Even if the hazelnut crop contains high levels of radiation, we will not let the crop remain in the hands of the producers. If necessary we will destroy it." The price of hazelnuts dropped to 500 Turkish liras per kilogram on the open market. [Text] [Istanbul MILLIYET in Turkish 12 Sep 86 p 4] 9588

CSO: 5100/2406

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